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STATE OF CALIFORNIA  
STATE WATER RESOURCES CONTROL BOARD

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PUBLIC HEARING  
REGARDING WATER RIGHT APPLICATIONS FOR THE  
DELTA WETLANDS PROJECT  
PROPOSED BY DELTA WETLANDS PROPERTIES  
FOR WATER STORAGE ON WEBB TRACT, BACON ISLAND,  
BOULDIN ISLAND, AND HOLLAND TRACT  
IN CONTRA COSTA AND SAN JOAQUIN COUNTIES

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HELD AT  
901 P STREET  
SACRAMENTO, CALIFORNIA  
MONDAY, JULY 14, 1997  
9:00 A.M.

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Reported by: ESTHER F. WIATRE  
CSR NO. 1564

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SACRAMENTO, CALIFORNIA  
MONDAY, JULY 14, 1997

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HEARING OFFICER STUBCHAER: Call the hearing to order.  
Good morning. Are you all ready to have a long day  
today?

We will continue with these proceedings. The order of  
business today will be to finish the cross-examination of  
the Delta Wetlands' panel. We will call Mr. Etheridge, East  
Bay Municipal District, then Mr. Maddow from Contra Costa  
Water District, then State Water Contractors, and California  
Department of Fish and Game.

I've been informed that Mr. Kavanaugh now is delayed in  
traffic.

Mr. Etheridge, was he one of the witnesses you wished  
to cross-examine?

MR. ETHERIDGE: No, he was not.

HEARING OFFICER STUBCHAER: That works out just fine.

So, good morning. Please give your name for the  
record.

MR. ETHERIDGE: Good morning, Mr. Stubchaer. My name  
is Fred Etheridge. I am in the Office of General Counsel at  
East Bay Municipal Utility District, East Bay MUD for short.

I will have questions today for Mr. Shaul and Mr.  
Hultgren. Before I get to my cross-examination, I did want  
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to bring to your attention one administrative matter, and I  
hope that this is the appropriate time to do so.

One of the District's two witnesses, Mr. Bowen, will be  
out of town this Monday and Tuesday. So as not to interrupt  
the flow of the proceeding, I would request that East Bay  
MUD proceed with its direct examination whenever we come up  
in the flow of this proceeding. I believe we are after  
Contra Costa Water District. If that happens next week,  
then there is no need to change anything.

If by chance, we come up this week, I propose we go  
forward then. I would give my opening statement, put on our  
fisheries expert, Mr. Nuzum, and then conclude with Mr.  
Bowen next, when he becomes available. I wanted to make  
that request.

HEARING OFFICER STUBCHAER: We will see how the flow  
goes as the week goes on.

MR. ETHERIDGE: Thank you.

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CROSS-EXAMINATION OF DELTA WETLANDS PROPERTIES  
BY EAST BAY MUNICIPAL DISTRICT  
BY MR. ETHERIDGE

MR. ETHERIDGE: Mr. Shaul, I understand from your  
testimony that you wrote Chapter 3F, Fishery Resources, of  
the Delta Wetlands Draft EIR; is that correct?

MR. SHAUL: That is correct.

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MR. ETHERIDGE: Is it your opinion that diversions to

02 fill Delta Wetlands' islands that coincide with major  
03 periods of juvenile salmon out-migration could have  
04 significant adverse effects on the chinook fishery?

05 MR. SHAUL: Diversions to fill coincide with  
06 significant --

07 MR. ETHERIDGE: I was looking at Page 3F-21 of the EIR.  
08 It states there that:

09 Diversions to fill the DW Project islands  
10 that coincide with major periods of juvenile  
11 out-migration that end in April and May could  
12 have significant adverse effects.

13 (Reading.)

14 MR. SHAUL: Right, depending on what the conditions  
15 were in the Delta.

16 MR. ETHERIDGE: Is it your belief that the major period  
17 of Mokelumne River juvenile salmon out-migration is in April  
18 and May?

19 MR. SHAUL: Major periods for naturally produced  
20 fall-run chinook salmon in Mokelumne River is April, May.

21 MR. ETHERIDGE: Is there a difference, in your opinion,  
22 between naturally produced and hatchery produced salmon that  
23 are released into the Mokelumne River?

24 MR. SHAUL: I don't know the exact hatchery operation.  
25 I am not familiar with the hatchery operations on the

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01 Mokelumne.

02 HEARING OFFICER STUBCHAER: Excuse me just a moment.

03 Can the people in the back of the room hear?

04 All right. Fine.

05 MR. ETHERIDGE: On Page 3F-21 of the Draft EIR, the  
06 sentence that reads:

07 Diversions to fill the DW Project islands  
08 that coincide with major periods of juvenile  
09 out-migration (e.g. in April and May) ...

10 (Reading.)

11 I took that to mean that you believe that the major  
12 periods of juvenile out-migration were in April and May.

13 Is that correct?

14 MR. SHAUL: That is correct.

15 MR. ETHERIDGE: Is that one of the reasons why, as a  
16 mitigation, Delta Wetlands is not to divert to storage in  
17 April and May?

18 MR. SHAUL: That is one of the reasons; that is true.

19 MR. ETHERIDGE: Did you examine potential Delta  
20 Wetlands Project impacts on out-migrating Mokelumne River  
21 salmon fry during January, February, and March?

22 MR. SHAUL: We considered the impact on the fry, in  
23 general, in February and March, on fall-run fry from any of  
24 the systems, from San Joaquin, Mokelumne, Sacramento, and  
25 what kind of impacts that may have on fry.

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01 MR. ETHERIDGE: Is it your opinion that in those  
02 months, in January, February, and March, fry might be  
03 migrating from Mokelumne and other rivers through the Delta?

04 MR. SHAUL: I think that is possible, yes.

05 MR. ETHERIDGE: Are you aware that in some years,  
06 particularly wetter years, the majority of Mokelumne River

07 salmon juveniles may out-migrate from the river as fry and  
08 not as smolts?

09 MR. SHAUL: In wetter years?

10 MR. ETHERIDGE: Correct.

11 Mr. Shaul: That the majority of the Mokelumne River  
12 fish could out-migrate as fry and not as smolts?

13 MR. ETHERIDGE: Right.

14 MR. SHAUL: They could leave the Mokelumne River as  
15 fry?

16 MR. ETHERIDGE: Yes.

17 MR. SHAUL: I would think that is true. They would  
18 move downstream by higher flows, if those flows occurred,  
19 depending on what defines a wetter year. If flows occurred  
20 after they emerge from the gravel, sometime in February and  
21 March.

22 MR. ETHERIDGE: If salmon fry were in the vicinity of  
23 the Delta Wetlands Project diversion facilities when those  
24 facilities were in operation, would the fry be impacted by  
25 the Delta Wetlands' diversions?

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01 MR. SHAUL: The fries that enter the Delta during  
02 February and March are likely to stay in the Delta to rear;  
03 and they enter the Delta from the Mokelumne River, so in the  
04 northerly part of the Delta. So, they could be impacted.

05 The Delta Wetlands' diversions have fish screens, and  
06 the location of the Delta Wetlands' diversions is not in  
07 place the same -- is not in a place where the Mokelumne  
08 River fish first enter the Delta. And once juvenile or fry,  
09 they aren't really ready to go to the ocean yet. So they  
10 rear in the Delta until they are ready to go to the ocean.

11 Those fish, they are not really moving to -- they are  
12 not moving downstream to the ocean at that time, so they are  
13 really rearing in the Delta. So the impact is going to be  
14 different than it would be on smolt. Trying to get to the  
15 ocean, they could get confused on their migration. So there  
16 could be some impact, but it wouldn't be as great as on  
17 smolt, would be my opinion.

18 MR. ETHERIDGE: Suppose you had fry that were, as you  
19 say, rearing in the Delta, once they've moved down to the  
20 Mokelumne River in February, so they are in the Delta,  
21 would they potentially be in the vicinity of the Delta  
22 Wetlands Project diversions?

23 MR. SHAUL: A proportion of them could be in the  
24 vicinity. But as you say, the Delta Wetlands Project  
25 diversions are screened.

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01 MR. ETHERIDGE: What would the nature of any potential  
02 impacts on the fry be?

03 MR. SHAUL: If they were in the vicinity of the  
04 diversions there could be -- I guess there could be some  
05 increased predation; that would probably be the major impact  
06 associated with fry. I would expect that fry could avoid  
07 the fish screens because the fish screens operate as  
08 expected, with a low approach velocity.

09 MR. ETHERIDGE: Do you believe the Delta Wetlands  
10 Project would impact Mokelumne River smolt in March, when  
11 and if Delta Wetlands is diverted?

12 MR. SHAUL: In March, I would expect a low proportional  
13 population to be smolting in March from the Mokelumne.

14 MR. ETHERIDGE: But later in the year, after the  
15 no-diversion period of April and May, for instance in June,  
16 would you expect there to be any impacts on the Mokelumne  
17 River smolt?

18 MR. SHAUL: I would expect those to be low. There  
19 could be some smolt moving through in June, depending on the  
20 years. But I would expect that to be low, too, because  
21 mostly the Mokelumne fish move in April, May, as far as  
22 naturally produced fall-run.

23 MR. ETHERIDGE: On Page 34 of your testimony you state  
24 that:

25 Available information does not indicate that  
0546 structures along Delta channels increase  
01 predation to a significant level. (Reading.)

02 Is that correct?

03 MR. SHAUL: Yes.

04 MR. ETHERIDGE: Upon what available information did you  
05 rely upon for that finding?

06 MR. SHAUL: My conclusions here are based on my  
07 experience. There isn't a lot of information on that type  
08 of effects in the Delta: What effect does a structure have  
09 on predation? That is mostly based on my experience working  
10 in other areas, primarily with artificial structures,  
11 artificial reefs and fish attraction devices and things of  
12 that sort, where, generally, you can get a concentration of  
13 predators around certain kinds of structures, but not  
14 necessarily any increase in the abundance or biomass  
15 predators. Because you really --

16 In order to get an increase in actual predation rate,  
17 you also need to concentrate the prey. And we just -- there  
18 isn't any evidence, available information, that indicates  
19 that that happens with structures such as boat docks of that  
20 sort.

21 It does happen under conditions, say, of Clifton Court  
22 Forebay. There is a concentration of predators, and there  
23 is a pretty well-documented increase in predation associated  
24 with that.

0547 The question, of course, is whether, if you kept the  
01 predators from entering Clifton Court Forebay, would the  
02 predators then concentrate in the channels outside of  
03 Clifton Court Forebay? That is really not what I am saying.

04 MR. ETHERIDGE: Am I correct that in one of your  
05 answers to Mr. Jackson's questions on cross-examination last  
06 week you stated that the types of structures, the boat docks  
07 and the pilings and diversion pipes proposed by Delta  
08 Wetlands could harbor predator species and, so, increase  
09 predation?

10 MR. SHAUL: They could. I wouldn't expect a  
11 significant increase in predation, but there could be an  
12 associated increase in predation. I don't think it would  
13 really be a significant increase.

14 MR. ETHERIDGE: Upon what do you base the distinction  
15 between impacts would result, but the finding that they  
16

17 would not be significant?

18 MR. SHAUL: Professional judgment. It is based on my  
19 experience, I guess, and from reading literature on fish  
20 attraction devices and artificial reefs, similar structures,  
21 trying to provide structures that actually attract, create  
22 habitat for predators.

23 MR. ETHERIDGE: Is it fair to say that your opinion  
24 then on the predation issue would be that the Delta Wetlands  
25 Project facilities could increase predation, but any related  
0548 impacts would not be significant?

01 MR. SHAUL: That is true.

02 MR. ETHERIDGE: Have you examined potential impacts to  
03 Delta Wetlands Project diversions in the fall, for instance,  
04 in September, October, November, on returning adult chinook  
05 salmon?  
06

07 MR. SHAUL: We considered that in using the best  
08 available information on what kinds of things appear to  
09 affect returning adult salmon in the Delta. And from what I  
10 was -- I couldn't come to any real conclusion that it would  
11 be significant, any real conclusion that it was a  
12 significant impact.

13 MR. ETHERIDGE: Did that analysis uncover any impact?

14 MR. SHAUL: I am trying to recall what was in the  
15 EIR/EIS on the adults.

16 MR. ETHERIDGE: Was there any finding that the Delta  
17 Wetlands' operations could, by diversions to storage or  
18 releases of water from storage, obscure the olfactory queues  
19 in which adult salmon rely to return to their home stream?

20 MR. SHAUL: I don't have any evidence -- I've never  
21 seen any evidence for the Delta to really show that. The  
22 issues that have been in Delta, as far as adult upstream  
23 migration, primarily to do with water temperature and with  
24 dissolved oxygen, and that has been identified as a problem  
25 in the Lower San Joaquin.

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01 And other problems, such as upstream migrants and  
02 attraction of Sacramento River fish in Central Delta, and  
03 they have to move up either Georgiana Slough or the Cross  
04 Channel, closing Cross Channel gates during that migration,  
05 then you can have problems.

06 As far as the fish actually being able to not find the  
07 way to whichever stream they are going to because of queues,  
08 olfactory queues, that hasn't been demonstrated.

09 MR. ETHERIDGE: Thank you, Mr. Shaul.

10 I have a few questions for Mr. Hultgren.

11 In your written testimony you described the proposed  
12 use of interceptor wells on Delta Wetlands' reservoir  
13 islands to control seepage; is that correct?

14 MR. HULTGREN: Yes.

15 MR. ETHERIDGE: Does Delta Wetlands propose interceptor  
16 wells on islands adjacent to Delta Wetlands' reservoir  
17 islands?

18 MR. HULTGREN: No.

19 MR. ETHERIDGE: So, it is only on the Delta Wetlands  
20 reservoir islands that Delta Wetlands proposes interceptor  
21 wells?

22 MR. HULTGREN: Yes.  
23 MR. ETHERIDGE: Is it true that a flooded island may  
24 cause an increase in hydrostatic head, thereby causing  
25 seepage from that flooded island to a non flooded adjacent  
0550 island?  
01 island?  
02 MR. HULTGREN: Yes.  
03 MR. ETHERIDGE: Is that what Figure 2 in your written  
04 testimony essentially shows?  
05 MR. HULTGREN: Yes.  
06 MR. ETHERIDGE: On that diagram, it has on the lower  
07 half, a series of arrows moving from right to left of the  
08 diagram, which is labeled Direction of Seepage; is that  
09 correct?  
10 MR. HULTGREN: Correct.  
11 MR. ETHERIDGE: Is it your opinion that a flooded  
12 Delta Wetlands' island could, in the absence of any seepage  
13 control, cause seepage on nearby islands?  
14 MR. HULTGREN: Yes.  
15 MR. ETHERIDGE: And the process by which that would  
16 occur is essentially what is shown in Figure 2?  
17 MR. HULTGREN: Yes.  
18 MR. ETHERIDGE: In your opinion, the operation of the  
19 proposed interceptor wells on the Delta Wetlands' reservoir  
20 islands can prevent seepage despite any increase hydrostatic  
21 head that is caused by the flooding of those islands?  
22 MR. HULTGREN: Yes.  
23 MR. ETHERIDGE: Does that remain true despite the fact  
24 that a flooded Delta Wetlands' island is also surrounded by  
25 waters of the Delta?  
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01 MR. HULTGREN: Yes.  
02 MR. ETHERIDGE: How many interceptor wells does Delta  
03 Wetlands propose to install on Bacon Island?  
04 MR. HULTGREN: I don't know the exact -- Let me back  
05 up.  
06 The current plan is to ring the entire island with  
07 interceptor wells, and there would be such that it -- that  
08 whatever is needed to control that water, and that is a  
09 final design issue. But there will be lots of them.  
10 MR. ETHERIDGE: If the seepage cannot be controlled by  
11 the then existing interceptor wells installed by Delta  
12 Wetlands, is it Delta Wetlands' plan to add interceptor  
13 wells until enough wells have been installed to control  
14 seepage?  
15 MR. HULTGREN: That is the fundamental concept. In my  
16 direct testimony, I think as well as, perhaps, in the  
17 written here, we described how they will do it in stages.  
18 And each stage will be stopped to check what is going on,  
19 and then make the adjustments, either in pumping rates or  
20 adding wells. And the initial concept and intent is to do  
21 it by adjusting flow rates and adding wells.  
22 MR. ETHERIDGE: Is there an upper limit on the number  
23 of interceptor wells that Delta Wetlands could so  
24 establish?  
25 MR. HULTGREN: Not that I am aware of.

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01 MR. ETHERIDGE: Are there any engineering limitations  
02 on the number of interceptor wells you can place on the  
03 levee structures?

04 MR. HULTGREN: Not that I am aware of.

05 MR. ETHERIDGE: I believe you testified last week on  
06 cross-examination that Delta Wetlands plans to discharge all  
07 the water pumped by these interceptor wells back onto Delta  
08 Wetlands' islands; is that correct?

09 MR. HULTGREN: Yes.

10 MR. ETHERIDGE: Looking at Figure 3 of your written  
11 testimony, would it be accurate to show an arrow from the  
12 top of the interceptor well shown there back down to the  
13 flooded reservoir island on the right?

14 MR. HULTGREN: Yes.

15 MR. ETHERIDGE: Would it be fair to say that this is a  
16 form of cycling of water?

17 MR. HULTGREN: Yes. What do you mean by cycling? You  
18 mean that they were capturing the water that would be  
19 seeping off and returning it to the island?

20 MR. ETHERIDGE: Right. In other words, the operation  
21 of Delta Wetlands will flood a reservoir island. Some of  
22 that water will seep and be picked up by the interceptor  
23 well and then be discharged back onto the flooded island?

24 MR. HULTGREN: Yes.

25 MR. ETHERIDGE: You testified last week that  
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01 interceptor wells have been used in construction projects;  
02 is that correct?

03 MR. HULTGREN: Correct.

04 MR. ETHERIDGE: I believe you gave the example of  
05 using interceptor wells to dewater an area for construction  
06 of an office building with a deep basement. Is that correct?

07 MR. HULTGREN: Correct.

08 MR. ETHERIDGE: Do you know the size in acres of an  
09 average city block?

10 MR. HULTGREN: Not off the top of my head.

11 MR. ETHERIDGE: In the range of 30 to 50 acres, would  
12 that be a fair range?

13 MR. HULTGREN: I never thought how many acres. A few  
14 acres. Relative Delta Wetlands I am sure your point is.

15 MR. ETHERIDGE: Right. My next question is what is the  
16 size in acres of Bacon Island?

17 MR. HULTGREN: Actually, I don't know that number, but  
18 it is large, relative to a city block.

19 MR. ETHERIDGE: That's probably a fair statement.

20 Have interceptor wells, to your knowledge, ever been  
21 used to prevent seepage on a flooded island or islands on  
22 the scope proposed here by Delta Wetlands?

23 MR. HULTGREN: I can't give an example of an island,  
24 but certainly pumped wells are used, as well as gravity  
25 flow wells used, to control groundwater levels. This

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01 includes large projects; and what seems large to me are the  
02 levees in the Mississippi River and the Missouri River where  
03 relief wells are commonly used to control high heads during  
04 flood stage.

05 MR. ETHERIDGE: On the subject of monitoring, on Page

06 19 of your testimony, you state that seepage will be  
07 monitored by piezometers located on neighboring islands; is  
08 that correct?

09 MR. HULTGREN: Yes.

10 MR. ETHERIDGE: Figure 6 of your testimony depicts  
11 piezometer locations on neighboring islands; is that  
12 correct?

13 MR. HULTGREN: Correct. It is conceptual. These  
14 aren't exact locations, but it is to give them a feeling for  
15 the approximate locations.

16 MR. ETHERIDGE: On that Figure 6, are the piezometers  
17 shown as black solid dots?

18 MR. HULTGREN: Yes.

19 MR. ETHERIDGE: What is the proposed spacing intervals  
20 of the piezometer to be placed on Delta Wetlands on Woodward  
21 Island?

22 MR. HULTGREN: Approximately 1000 feet apart.

23 MR. ETHERIDGE: On what standard did you base that  
24 spacing?

25 MR. HULTGREN: I don't believe there is a standard.

0555

01 MR. ETHERIDGE: I believe you mentioned a couple of  
02 minutes ago that you weren't aware of the use of interceptor  
03 wells on flooded island projects such as this?

04 MR. HULTGREN: Correct.

05 MR. ETHERIDGE: Are you aware of the use of monitoring  
06 wells on flooded island projects such as that proposed by  
07 Delta Wetlands?

08 MR. HULTGREN: Say that question again.

09 MR. ETHERIDGE: Are you aware of any existing projects  
10 that use monitoring wells in the way proposed by Delta  
11 Wetlands here?

12 MR. HULTGREN: Not off the top of my head.

13 MR. ETHERIDGE: Do you know at this time how many  
14 monitoring wells Delta Wetlands proposes for Woodward  
15 Island?

16 MR. HULTGREN: There are intended to be a thousand --  
17 spaced at a thousand feet along the cut there. I suspect  
18 the dots represent that. So it shows about eight along that  
19 cut, plus at least one background well in the far side. So,  
20 I assume that cut is about 8,000 feet long.

21 MR. ETHERIDGE: On Palm Tract, located to the west of  
22 Bacon Island, do you know what the spacing interval of the  
23 proposed monitoring wells is there?

24 MR. HULTGREN: I think for most agricultural islands  
25 we've used a spacing of 1500 feet, and probably applies to

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01 Palm.

02 MR. ETHERIDGE: What about the spacing interval of the  
03 monitoring wells on Lower Jones Tract?

04 MR. HULTGREN: I believe those are 1500 as an  
05 agricultural island, also.

06 MR. ETHERIDGE: Thank you, Mr. Hultgren. Those are all  
07 the questions I have.

08 Thank you, Mr. Stubchaer.

09 HEARING OFFICER STUBCHAER: Thank you Mr. Etheridge.

10 Mr. Maddow.

11 (Discussion held off the record.)

12 ---oOo---

13 CONTINUED CROSS-EXAMINATION OF DELTA WETLANDS PROPERTIES  
14 BY CONTRA COSTA WATER DISTRICT

15 BY MR. MADDOW

16 MR. MADDOW: Ready Dr. Kavanaugh?

17 DR. KAVANAUGH: Certainly.

18 MR. MADDOW: Thank you, Mr. Stubchaer, for allowing me  
19 a few more minutes just for questions of Dr. Kavanaugh. He  
20 is the only witness I will address any questions to.

21 For the reporter, I am Robert Maddow. I am appearing  
22 on behalf of Contra Costa Water District. I will wait a  
23 second while Dr. Kavanaugh is now arriving at the  
24 microphone.

25 Dr. Kavanaugh, last week you suggested that it was  
0557

01 probable that the EPA would merely ask utilities to try to  
02 meet the goals of the TOC removal requirement of the  
03 disinfectant disinfection by-products rule. Can you give me  
04 one example where EPA took this enforcement approach to any  
05 rule that is promulgated under the Safe Drinking Water Act?

06 DR. KAVANAUGH: I think my point that I was trying to  
07 make was that, with respect to TOC, the requirements that I  
08 believe are in the proposed rule suggest that a performance  
09 requirement will be specified. And in the case of utilities  
10 treating the Delta waters, I believe it will be 30 percent  
11 removal if the DOC is below 4 and 35 if it is above 4. And  
12 I was suggesting that to require monitoring and establishing  
13 performance and using that as a basis for regulating the  
14 utilities was unlikely.

15 I have found out subsequently that as part of the  
16 proposed rule, I guess you will be required, the utility  
17 will be required to specify, based on monthly DOC or TOC  
18 measurements, what the precursor removal efficiency of their  
19 utility is. They will be subject to strict control of that  
20 parameter; that is, the TOC performance.

21 So, I misspoke on that particular issue, Mr. Maddow.  
22 However, I can't quote you any other example of where that  
23 approach would be taken.

24 MR. MADDOW: Dr. Kavanaugh, in your testimony you spoke  
25 about DOC concentration, and there was some consideration of  
0558

01 the one-meter deep Delta island shallow pond, the test that  
02 was done. If the DOC concentration on a one-meter deep  
03 Delta island shallow pond or wetland was 40 milligrams per  
04 liter, would you expect the DOC concentration in a  
05 five-meter deep reservoir on this same site to be one-fifth  
06 or 20 percent of the DOC in the shallow pond?

07 DR. KAVANAUGH: Yes, I would.

08 MR. MADDOW: If that shallow pond that I described had  
09 only been a half-meter deep, rather than one, would the DOC  
10 concentration have been 80 milligrams per liter, or would it  
11 have been twice as concentrated?

12 DR. KAVANAUGH: Not necessarily. It doesn't quite work  
13 in the exact ratios because there is some effect of the  
14 depth because of contact with vegetated biomass. But,  
15 certainly, the approach that I suggested in my testimony

16 last Tuesday is correct; that is, the amount of organic  
17 carbon is relatively constant and the amount of carbon would  
18 be mixed in with the amount of water put onto the reservoir  
19 island.

20 MR. MADDOW: We learned from Dr. Brown's testimony  
21 there will be some years in which the reservoir islands will  
22 not be fully filled. If the reservoir is only half filled,  
23 would the DOC concentration be twice the eight milligrams  
24 per liter concentration you discussed in your testimony as a  
25 result of less dilution?

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01 DR. KAVANAUGH: I never said eight milligrams per  
02 liter, Mr. Maddow. I have used a mass, a balance approach  
03 to estimate the quantity of DOC that may be released to the  
04 reservoir islands. If the reservoir is half full, the  
05 incremental increase of the DOC would be twice what it is  
06 if it was completely full.

07 So, whatever that incremental increase is, it would  
08 likely be twice what it would be in a full reservoir, and  
09 that increase, incremental increase, would be added to the  
10 background DOC. And I don't know whether that will be five,  
11 six, or eight, whatever it will be.

12 MR. MADDOW: Dr. Kavanaugh, if a partially filled  
13 reservoir island had a DOC concentration of 16 milligrams  
14 per liter, wouldn't that exceed the 10.6 milligram per liter  
15 concentration associated with exceeding the DOC significance  
16 level that you discussed on Page 44 in Delta Wetlands 13?

17 DR. KAVANAUGH: No, it wouldn't. The number that I  
18 used there was equated to a full island and to maximum  
19 discharge. If you had 16 milligrams in a half full  
20 reservoir, you would be restricted in the rate at which you  
21 can discharge the water off of the island to maintain the  
22 export DOC level within the significance level.

23 MR. MADDOW: In Section 5, I believe it is on Page 42  
24 of your exhibit, you concluded that molecular diffusion is  
25 the main source of DOC loading, as I recall, Dr. Kavanaugh,  
0560

01 and that factors such as wind mixing, bioturbation, and pore  
02 pumping were of little or no consequence; is that correct?

03 DR. KAVANAUGH: No, that is not accurate. I stated in  
04 my testimony, and in my written testimony, that wind mixing  
05 -- the three processes that you mentioned, wind mixing, pore  
06 pumping, and bioturbation, could be significant. My  
07 analysis accounts for that.

08 As I mentioned in my testimony, molecular diffusion  
09 estimates result in an estimate of about one milligram of  
10 carbon per square meter per day being released, and I've  
11 used 5 and 25, which is 5 and 25 times more than what is  
12 estimated by molecular diffusion alone.

13 The three processes that you have mentioned are  
14 accounted for by geochemists. By increasing the effective  
15 diffusion coefficient, and typical values are ten to a  
16 hundred times greater than the molecular diffusion, the rate  
17 of diffusion, however, is proportional to the square root of  
18 the diffusion coefficients. So, that would be a factor of  
19 three to ten times higher than molecular diffusion. I have  
20 used 5 to 25 times higher.

21 So, I believe my analysis has fully accounted for those  
22 three processes which, incidentally, are impossible to  
23 quantify in any accurate way. And so the approach that I've  
24 taken is a well-accepted approach, and it accounts for the  
25 uncertainties associated with those three processes that you

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01 have mentioned.

02 MR. MADDOW: In regard to the uncertainty about those  
03 three processes, Dr. Kavanaugh, you have made reference to  
04 bioturbation on Page 42 in your exhibit, but I didn't find  
05 it in Table V-5. I appreciate the example that you just  
06 gave.

07 As I understood your exhibit, you believe that the  
08 mixing caused by benthic organisms will only be to a depth  
09 of a few centimeters; is that correct?

10 DR. KAVANAUGH: I have stated that. And I have  
11 reviewed some literature on the subject. I did not find a  
12 lot of literature on benthic organisms and peaty soils.  
13 Most of the information comes from literature on ocean  
14 sediments or estuarial sediments. I have seen articles  
15 that suggest depths deeper than a few centimeters, down to  
16 tens of centimeters.

17 But it appears to me that, based on what I reviewed, it  
18 is unlikely that there would be much deeper than a few  
19 centimeters. Certainly, over time where there will be some  
20 build up of inorganic turbidity that will settle on the  
21 bottom of the reservoirs over time. So, I think a few  
22 centimeters is a reasonable estimate.

23 MR. MADDOW: Again, on Page 42 on Delta Wetlands  
24 Exhibit 13 in discussing wave action, as I understood that  
25 page of your exhibit, Dr. Kavanaugh, you were referring to

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01 the reservoir island at 22-foot water storage depth. Would  
02 you expect that during those periods of time when the  
03 islands will be at depths less than 22 feet, that wave  
04 action might have a greater impact on DOC loading?

05 DR. KAVANAUGH: When the reservoirs are more shallow  
06 than the 22 feet and wind occurs, that certainly will be the  
07 case. There will be some additional mixing that occurs as  
08 the sediment water interface, yes.

09 However, I, again, believe that my analysis has  
10 accounted for that by relatively conservative analyses and  
11 estimates, in terms of quantitative estimates, incorporating  
12 all of the mixing phenomena. The wind mixing information  
13 that I have included in my testimony in the appendix goes  
14 into some detail as to the extent of wind mixing that might  
15 be observed.

16 And while it is likely that mixing will occur as the  
17 sediment water interface, the extent of that is likely to be  
18 relatively small. And by small I mean in the order of a few  
19 millimeters to a few centimeters, even in a more shallow  
20 reservoir condition.

21 I would also refer to the experiments that Dr. Brown  
22 completed on the Holland Tract experiment. And although it  
23 was only over three months, it was shallow, and it was quite  
24 clear most of the period of time; and that is documented in  
25 the Draft EIR/EIS.

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01 MR. MADDOW: One last question, one last pair of  
02 questions, Dr. Kavanaugh.

03 I believe you were present last week when Mr. Hultgren  
04 testified regarding the interceptors wells. And my  
05 recollection of his testimony is that he said that the wells  
06 would be spaced, last week I believe he said, approximately  
07 at 150-foot intervals. This morning, I am not sure whether  
08 you were present, but he said that was -- the exact spacing  
09 interval was a design question. So I believe he was saying  
10 that spacing was more conceptual.

11 But he said last week that, well, he thought it would  
12 produce in the range of 20 gallons per minute on the  
13 reservoir islands. Do you believe that Mr. Hultgren's  
14 continuous interceptor well pumping would produce, or would  
15 have the potential to produce, additional DOC loading?

16 DR. KAVANAUGH: As I mentioned in my testimony last  
17 Tuesday, that is not a subject that I looked at in my  
18 preparation for my testimony, Mr. Maddow. But, certainly,  
19 water that is recirculating back in the reservoir would  
20 contain some dissolved organic carbon. So, in that sense,  
21 it would be a source.

22 One would have to determine where that water is coming  
23 from. As I understand the subsurface, according to Mr.  
24 Hultgren, there is a sandy aquifer beneath the peaty soil.  
25 If the water is coming through the sandy aquifer, I would

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01 expect the DOC to be relatively low. And so, consequently,  
02 I wouldn't expect it to be a very significant source;  
03 significant in this case defined as more than five percent  
04 of the numbers that I have used.

05 MR. MADDOW: Have you done any calculations of the  
06 volumes of water that would be involved in this  
07 recirculation system, Dr. Kavanaugh?

08 DR. KAVANAUGH: I have not sat down and worked that  
09 out. I don't know what the numbers are at this point.

10 MR. MADDOW: I have no further questions, Mr.  
11 Stubchaer. Again, my appreciation for your allowing me to  
12 get up a second time.

13 HEARING OFFICER STUBCHAER: Thank you, Mr. Maddow.

14 State Water Contractors, Cliff Schulz.

15 Morning, Mr. Schulz.

16 MR. SCHULZ: Good morning.

17 ---oOo---

18 CROSS-EXAMINATION OF DELTA WETLANDS PROPERTIES

19 BY STATE WATER CONTRACTORS

20 BY MR. SCHULZ

21 MR. SCHULZ: My name is Cliff Schulz. I am  
22 representing the State Water Contractors today. And my  
23 first subject refers to Dr. Brown, and will deal with some  
24 of the hydrology that went into what was provided to Dr.  
25 List in preparation of some of those exhibits.

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01 Dr. Brown, as I understand your testimony, in  
02 developing your water supply data, your Exhibit 10, that you  
03 first ran DWRSIM, and, based on the output of DWRSIM, you  
04 then ran the SOS model to determine the water supply to the

05 Delta Wetlands Project.

06 Is that an accurate summary of your Exhibit 10?

07 DR. BROWN: That is right.

08 MR. SCHULZ: When you first ran DWRSIM -- let me ask  
09 you a question preparatory to that.

10 Do you consider yourself to an expert on DWRSIM?

11 DR. BROWN: Not expert on DWRSIM, no.

12 MR. SCHULZ: Do you have a good working knowledge of  
13 how DWRSIM operates?

14 DR. BROWN: I think I have a good working knowledge.

15 MR. SCHULZ: When you ran DWRSIM, did you modify in  
16 any way the Delta channel depletion formulas that are  
17 contained in DWRSIM?

18 DR. BROWN: No. We are using the results from the  
19 DWRSIM, including the depletion numbers.

20 MR. SCHULZ: So, when you ran DWRSIM, it included the  
21 channel depletions that were caused by the operation of the  
22 four islands for agricultural purposes?

23 DR. BROWN: That is right. The Delta Wetlands' islands  
24 are all in the Delta lowlands. Those are all included as ag  
25 operations.

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01 MR. SCHULZ: Would you describe your understanding of  
02 how DWRSIM treats those diversions for purposes of  
03 calculating the channel depletions within the Delta?

04 DR. BROWN: I am not sure I -- try that again.

05 MS. SCHULZ: Let me ask it in a leading way. It is my  
06 understanding that the way the tables in the formulas for  
07 DWRSIM work for the Delta, the channel depletions within the  
08 Delta, there is almost a table that has a day-by-day rate of  
09 net diversions, which would be gross diversions less return  
10 flow. And that in peak months, particularly in the summer,  
11 that runs somewhere around 45 to 4,600 cubic feet per  
12 second.

13 Is that consistent with your understanding of the way  
14 DWRSIM handles this calculation?

15 DR. BROWN: Actually, DWRSIM is not calculating channel  
16 depletions. Channel depletions are fed to the DWRSIM model  
17 as an input. In other words, they are already previously  
18 calculated based on the rainfall and the assumed diversions  
19 going on in the Delta.

20 So it is a fixed time series that varies each year,  
21 based on their estimates for the conditions being simulated,  
22 what the land use would be, and how much water is  
23 evaporating. And there is actually a soil moisture  
24 accounting involved.

25 But, nevertheless, that is all done previous to the

0567

01 DWRSIM. So, DWRSIM is not actually calculating anything;  
02 it's just including this as a water loss term for the Delta  
03 or a water gain if it is raining hard.

04 MR. SCHULZ: That is fine. That is what I was trying  
05 to get you to do. Mine was a far more simplified  
06 explanation. That works for me.

07 I believe I heard previous testimony that Delta  
08 Wetlands believes that the four islands represented about  
09 five percent of that Delta demand. Is that correct?

10 DR. BROWN: Right. The Delta lowlands, that is of the  
11 Delta lowlands, is approximately 400,000 acres. The Delta  
12 Wetlands Project is approximately 20,000. So that is about  
13 five percent.

14 MR. SCHULZ: Can you convert that for me into what you  
15 believe the daily depletion rate is for those four islands?  
16 Is it around 200, 225 cubic feet per second, somewhere in  
17 that range?

18 DR. BROWN: Yes, it is.

19 MR. SCHULZ: What did you do with that 200 to 225 cubic  
20 feet per second when you ran the SOS model, since DWRSIM, as  
21 we just established, has that as being diverted? But, in  
22 fact, under your Delta Wetlands' operations, it is, I  
23 believe, not. What did you do with that in your SOS model?

24 DR. BROWN: The SOS model has a month-by-month  
25 adjustment. So, for each calendar month we had estimated  
0568

01 what the change in the depletion would be because of the  
02 operation of the reservoir islands and the habitat islands.

03 So, just for simple discussion purposes, the Delta SOS  
04 model reduces the depletion by that amount that had been  
05 going to the ag island operations; and so that Delta  
06 depletion term is reduced by, we will use the five percent  
07 for discussion purposes. That water is then not being  
08 diverted. Let's say we were using the 4,500 as a maximum,  
09 say in July, 4,500 cfs; that would be reduced by, let's say,  
10 the 250 for discussion to 4250, is now the depletion term.

11 MR. SCHULZ: That water was allowed to become Delta  
12 outflow?

13 DR. BROWN: That water is now in the Delta and,  
14 depending on the applicable rules, it could either be  
15 exported or it could increase Delta outflow.

16 MR. SCHULZ: Dr. Brown, do you believe that if the  
17 Delta Wetlands Project is built and the irrigation demand  
18 was reduced, as you have described, that DWR and running  
19 DWRSIM or in doing their daily operations, would leave the  
20 Delta, that channel depletion formula, as it is or would you  
21 expect them to reduce it to reflect then the now actual  
22 conditions?

23 DR. BROWN: Well, I think you are switching games on me  
24 because we are talking about the monthly planning model. Is  
25 your question to the actual operations of the state and  
0569

01 federal projects?

02 MR. SCHULZ: I think I can ask that question either  
03 way. Let's ask it on the planning models first.

04 Would you expect that DWR and the Bureau would modify  
05 their planning models to reflect the new actual channel  
06 depletions?

07 DR. BROWN: I would think so. Once the project is  
08 built and operating, they would reduce their estimates of  
09 depletion. In fact, they periodically readjust to the  
10 anticipated land use that would be in the Delta, and this  
11 would certainly represent a change in the land use. I think  
12 it would be adjusted.

13 MR. SCHULZ: The operators, would you expect that, in  
14 estimating the channel depletions, which they know are going

15 to occur in order to decide how much water to release from  
16 upstream reservoirs in times of balanced conditions, would  
17 you expect that they would also reflect the new reality of  
18 the reduced diversions?

19 DR. BROWN: I really don't know how accurately they  
20 trust their estimates, and whether they make any adjustment  
21 for this five-percent change.

22 MR. SCHULZ: Then on the overheads that were used by  
23 Dr. List, both that -- that is the one before the correction  
24 and I believe the bottom one is the one after the  
25 correction.

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01 DR. BROWN: That is the bottom one.

02 HEARING OFFICER STUBCHAER: For the record, would you  
03 identify --

04 MR. SCHULZ: That is Figure 10 from Exhibit 14A.

05 Those graphs, both the top and bottom, both Figure 10  
06 and Figure -- they are both Figure 10. Figure 10 and Figure  
07 10. Both of those contain the outflow parameters, which you  
08 and I have just described; isn't that right, both the top  
09 and bottom graphs?

10 DR. BROWN: We may as well just work on the bottom  
11 since this is the corrected version. That is right.

12 MR. SCHULZ: Is there any difference in the way the  
13 top one treats the outflow, because Dr. List made some  
14 comparison last week between the outflow and the top and  
15 bottom one? I believe both the top and bottom one contain  
16 the same outflow assumptions. Isn't that correct?

17 DR. BROWN: That is the error.

18 MR. SCHULZ: In one case it wasn't being diverted at  
19 the pump at all?

20 DR. BROWN: That is right.

21 MR. SCHULZ: In terms of any increment that is going to  
22 Delta outflow, they would both have the same -- I guess you  
23 are right.

24 DR. BROWN: Not quite. It's true that this model  
25 assumed that all of the reduced agricultural diversions from

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01 the project would show up as increased Delta outflow that  
02 month. The purpose of this analysis is to do a comparison  
03 between the no-action and with project conditions. The  
04 project effects is to reduce the agricultural diversion and  
05 increase Delta outflow. That is the project effect.

06 MR. SCHULZ: That is what I am questioning you on, Dr.  
07 Brown. Do you really think that is that project effect? Or  
08 do you think the project effect is particularly in balanced  
09 conditions, say, in July and August, but there would be a  
10 modification in project operations so that they would remain  
11 in balanced conditions?

12 DR. BROWN: The Delta Wetlands Project effect is to  
13 reduce ag drainage and thereby increase outflow. If one of  
14 the other water projects subsequently takes that water, that  
15 does not change the effect of the Delta Wetlands Project to  
16 initially increase Delta outflow.

17 MR. SCHULZ: Let me take a little more time on the  
18 impact of flooding these islands on Delta channel  
19 depletions. I would like you, if you would, try to draw

20 some distinctions for me between the channel depletions that  
21 will be caused by the reservoir islands and the channel  
22 depletions that will be changed on the habitat islands.

23 Have you assumed that there is a change in the net  
24 consumptive use on the habitat islands?

25 DR. BROWN: Yes, we have compared agricultural  
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01 diversion patterns on a month-by-month basis with the  
02 expected diversions in water requirements for the habitat  
03 islands under their adjusted land use. And the pattern  
04 shifts around, but the use of water overall is approximately  
05 half on the habitat island as it is on ag island.

06 MR. SCHULZ: About half. Is that described somewhere  
07 in your written testimony or environmental documentation?

08 DR. BROWN: Yes. What chapter is this in?

09 In the Draft EIR there is a table that compares the  
10 month-by-month water requirements under the ag operations or  
11 existing conditions compared to the habitat.

12 DR. SCHULZ: So, it shows both the change in pattern  
13 and a reduction in an annual consumptive use?

14 DR. BROWN: That is right. Even I have trouble finding  
15 stuff.

16 MR. SCHULZ: Huge volume of material.

17 DR. BROWN: We have determined it is in the appendices.

18 MR. SCHULZ: Rather than spending a lot of time, if you  
19 can find it, just provide us with a citation; it would be  
20 helpful.

21 DR. BROWN: I will.

22 MR. SCHULZ: Thank you.

23 Does your analysis assume there will continue to be ag  
24 drainage from the habitat islands?

25 DR. BROWN: Yes. From the habitat islands there is  
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01 drainage, and there will remain drainage. Drainage volumes  
02 would be reduced, and that is in this table that I am not  
03 able to find for you. There will continue to be some amount  
04 of drainage, approximately half, off of the habitat  
05 islands.

06 MR. SCHULZ: This may be a question for somebody else.

07 In terms of the organic loading that will be coming off  
08 of those islands, the total organic carbon issues, was it  
09 your assumption that there would be any change in the  
10 organic load from that drainage as compared to the use of  
11 islands for agricultural purposes because of the types of  
12 crops being grown or things of that nature?

13 DR. BROWN: Right. Even though the land use on those  
14 habitat islands will be changed and there will be much more  
15 of the acreage in continuously flooded or wetlands  
16 conditions, there is insufficient information right now to  
17 be sure that the DOC loads from those habitat islands would  
18 be reduced.

19 So, for purposes of this environmental impact  
20 assessment, we assumed that the DOC load from the habitat  
21 islands would remain equal to the lowland Delta agricultural  
22 loading. So for purposes of this planning analysis, the  
23 habitat islands were not assumed to have a reduced organic  
24 carbon loading.

25 MR. SCHULZ: And they were also not assumed to have an  
0574

01 increased loading?

02 DR. BROWN: No. Assumed to have increase. They were  
03 set equal to the loading under agricultural no-action  
04 conditions.

05 MR. SCHULZ: Thank you.

06 DR. BROWN: I found the table. It is Appendix A1,  
07 Table A1-8, which compares the Delta Wetlands Project  
08 islands under intensified agricultural, which is the  
09 no-action, to the Delta Wetlands Project island wildlife  
10 habitat uses on a month-by-month basis.

11 MR. SCHULZ: Thank you.

12 Would you describe the pulse flow agreements that you  
13 have made with the Fish and Wildlife Service through the  
14 biological opinions and the timing and how they are handled  
15 in your modeling studies?

16 DR. BROWN: Would you explain what you mean "pulse flow  
17 agreements"?

18 MR. SCHULZ: I am looking at -- and this switches over  
19 to David Forkel's testimony a little bit. Part of Forkel's  
20 testimony is a table which follows Page 10, Exhibit 7, which  
21 is the Delta Wetlands Final Operations Criteria. It has  
22 under the final operation criteria reserves environmental  
23 water. And I have, I believe in conversations I've heard, I  
24 am not sure whether inside or outside of this hearing, that  
25 there is an arrangement with the Fish and Wildlife Service

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01 that they can call for this water and ask for it to augment  
02 flows. And I believe you people feel that it is going to be  
03 probably in conjunction with pulse flow events that they are  
04 trying to schedule within the system this spring. That is  
05 what I am trying to deal with.

06 I want to know how those things are handled in your  
07 planning and in your operation studies.

08 DR. BROWN: If he is asking how we do it in modeling,  
09 if I am tracking what you are asking about, there is under  
10 the final operating criteria, if diversions are made to  
11 storage in certain months, then a fraction of the water  
12 diverted becomes reserved and is in the environmental water  
13 account, which can then be released at the direction of the  
14 resource agencies.

15 In the modeling, we simply account for how much water  
16 is that environmental credit and then release it in the  
17 month of March, if I recall. So, the timing of that water,  
18 that may be different each year as a resource agency decides  
19 on when best to use it; that cannot actually be modeled in  
20 this monthly approach. The amount and the release of that,  
21 I believe it is in March when we release that water in the  
22 model.

23 MR. SCHULZ: As I read the Final Operations Criteria,  
24 it depends upon whether or not the Delta smelt fall midwater  
25 trawl is above or below 239, as to whether that number is 10

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01 percent or 20 percent of the water stored; is that correct?

02 DR. BROWN: I believe that is correct, several of the  
03 operation criteria are on that fall midwater trawl index

04 value.

05 MR. SCHULZ: Do you know whether you use a 10 percent  
06 or 20 percent number or some average of that in your  
07 modeling study?

08 DR. BROWN: In the modeling, we model the project  
09 operating at the greatest possible magnitude. That is, we  
10 assume the fall midwater trawl index is above the 239 and  
11 did not separately model the conditions under that fall  
12 midwater trawl restrictions.

13 DR. SCHULZ: Your Table 3 in Exhibit 10, are you  
14 familiar with that --

15 DR. BROWN: Yes.

16 MR. SCHULZ: -- table?

17 Does the average yield number that is contained in that  
18 table, is it after, does it exclude the ten percent  
19 fisheries water?

20 DR. BROWN: Yes. In Table 3, the EIR Alternative 1 is  
21 compared to the Final Operations Criteria. The Final  
22 Operations Criteria include this fraction of water that is  
23 dedicated or under the -- that environmental water is  
24 included and is not in this yield number. This yield number  
25 is the amount that is able to be exported by the project.

0577

01 MR. SCHULZ: Okay. It is net of that number. It is  
02 net of the 10 percent. If the number actually turned out to  
03 be a blend of the 10 and 20, because of differing years,  
04 then would the yield number go down?

05 DR. BROWN: Yes. The yield number will be slightly  
06 reduced. The 10 percent does not apply to all diversions.  
07 The 10 percent applies to diversions in certain months. And  
08 so, it would not be a 10 percent reduction. It would just  
09 be, in the example you've given, doubling the amount  
10 dedicated to this environmental account.

11 DR. SCHULZ: It applies to diversions in January,  
12 February, and March, correct, among other months?

13 DR. BROWN: That is right.

14 MR. SCHULZ: What if the demand for one of these pulse  
15 flow events, the water that is dedicated to the fisheries  
16 agencies, what if it is released and conflicts with a water  
17 quality mitigation requirement or other requirement of the  
18 Delta Wetlands has in its operation plans? What happens  
19 when the immovable object meets the, what is other of the  
20 phrase, irresistible force, which prevails?

21 DR. BROWN: I don't know.

22 HEARING OFFICER STUBCHAER: Mr. Schulz, how much more  
23 time will you need?

24 MR. SCHULZ: I am a little over half done. Going as  
25 quickly as I can.

0578

01 Mr. Paff, I would like to, given that you're an  
02 experienced project operator, I would like to really ask you  
03 to answer some questions which deal with Table 3 of Exhibit  
04 10. I would like to get it from a project operator's  
05 perspective.

06 Would you define for me the term "firm yield"?

07 MR. PAFF: Firm yield -- my name is Don Paff. Firm  
08 yield can be defined in a number of ways, sometimes in the

09 drought periods, or it can be determined on an average  
10 annual yield.

11 MR. SCHULZ: Making a distinction between firm yield  
12 and average, would you distinguish those two, as the way  
13 they are usually used by the CVP and SWP?

14 MR. PAFF: As an operator, we did not determine yields.  
15 That was done by the planners and allocators of the contract  
16 CVP water, so I cannot do that for you.

17 MR. SCHULZ: You don't have an understanding of the  
18 term "firm yield" as used by the Bureau?

19 MR. PAFF: Generally, for 1928 through '44 period,  
20 given certain operating criteria for the project itself, and  
21 certain limitations on the water supply.

22 MR. SCHULZ: This, perhaps, goes back to Dr. Brown.  
23 Have you calculated a firm yield for the Delta Wetlands  
24 Project in terms of its critical dry cycle?

25 DR. BROWN: The Delta SOS model, using the results of  
0579

01 the DWRSIM, is estimating the project operations for each  
02 year. So we could go to Table 3 of my testimony and we  
03 could look up how much water the Delta Wetlands Project is  
04 simulated to provide as additional exports for these  
05 critical years.

06 In 1928 there was full operation of the project, and it  
07 exported in the Final Operations Criteria simulation 204,000  
08 acre-feet.

09 In 1929, there was no water available for diversions,  
10 and there was no export.

11 In 1930, there was an additional 92,000 acre-feet of  
12 water available for increased export, according to this  
13 simulation.

14 In 1931, there was, again, no available water for  
15 diversions and, therefore, no export.

16 In 1932, there was 78,000 acre-feet simulated  
17 available for additional exports.

18 In 1933, there was, again, no available water for  
19 diversions.

20 In 1934, there was not a great deal of water, but  
21 28,000 acre-feet of additional exports in 1934.

22 MR. SCHULZ: Would you, in looking at your Table 3,  
23 agree with me that, perhaps, the critical dry cycle for the  
24 Delta Wetlands Project is '87 through '92 rather than '28  
25 through '34?

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01 DR. BROWN: I believe we have gone through those  
02 numbers before. That would be another good test of what  
03 happens during dry conditions. And if you recall, we went  
04 through that, and there was the same sort of a pattern.  
05 Some of the dry years still have water available for  
06 diversion into this in-Delta project and some do not. We  
07 only simulated up through '91.

08 MR. SCHULZ: Would you have expected '92 to have had  
09 very much water in?

10 DR. BROWN: I didn't simulate '92.

11 MR. SCHULZ: You were asked on last Wednesday,  
12 whenever we were here before, whether you had done any  
13 studies, yield studies, that assumed that the diversions had

14 to be reduced because of low Delta smelt population numbers;  
15 and you said you had not, you didn't think it was  
16 appropriate because you were trying to measure the maximum  
17 potential environmental impact.

18 Do you recall that question and that response from last  
19 week?

20 DR. BROWN: Yes, I do.

21 MR. SCHULZ: As I understand Delta Wetlands' testimony,  
22 and it was also said, although I apologize for missing the  
23 first time of this last week, the project from an economic  
24 standpoint can't support further reductions in yield.

25 Have you, for the owners of Delta Wetlands, provided an  
0581

01 estimate of the firm and average yields of the project if,  
02 for example, in half of the years the Delta smelt index was  
03 less than 239 and that affected your diversions? Have you  
04 done any sensitivity analyses on yield in case some of the  
05 mitigation measures that you have discussed in your  
06 testimony come about?

07 DR. BROWN: No, not for this impact analysis. We have  
08 only done --

09 MR. SCHULZ: I didn't ask impact analysis. I asked in  
10 terms of analyzing what the -- you have in your Table 3  
11 154,000 Final Operations Criteria average yield. What I am  
12 asking here is not for environmental impact purposes, but  
13 for purposes of ascertaining what you really believe the  
14 real world yield of the project might be.

15 Have you run any simulations which included such things  
16 as a higher commitment to the fisheries agencies because  
17 some of the water is stored in months when the Delta smelt  
18 index is below 239? Have you considered if your diversions  
19 were reduced because of Delta smelt being near the pumps  
20 and, again, being under 239, have you analyzed what impacts  
21 those might have on the yield of the project?

22 DR. BROWN: No, I have not.

23 MR. SCHULZ: You have calculated the cost per acre-foot  
24 of the water developed by the Delta Wetlands Project?

25 DR. BROWN: No. I have no information on the cost of  
0582

01 the project.

02 MR. SCHULZ: Do any of the witnesses on the panel?  
03 Have they calculated?

04 Mr. Forkel.

05 MR. FORKEL: Backing up with regard to the modeling  
06 of the firm yield versus the average annual yield, you know,  
07 I think it's important to understand the evaluation that was  
08 done for the Draft EIR, and that looks at the total seven  
09 years.

10 What we have been looking at for the economic viability  
11 of the project is a little different from that.  
12 Unfortunately, we were unable to do a firm yield analysis as  
13 a stand-alone project. But we have looked at several of  
14 these items from a qualitative basis. It is difficult to  
15 determine when the fall midwater trawl index will occur.  
16 Attempts were made to try to tie it back to hydrology.

17 The best we could come up with is some qualitative  
18 looks. And I think Fish and Game testimony said 20 percent

19 of the fall midwater trawl index might come into play.  
20 So we have had to take a look at all of these items  
21 that are oftentimes discretionary, don't blend themselves to  
22 the perfect world of modeling, and that was done on a  
23 simply qualitative basis.

24 As far as the of water goes, looking at those numbers,  
25 we are looking at something in the area of 200 to \$300 an  
0583 acre-foot.

01 MR. SCHULZ: Thank you.

02 Would you agree, because of the nature and pattern of  
03 the water supply, this would be for either for Mr. Forkel or  
04 Dr. Brown, that the purchaser of this water would probably  
05 have to have some of its own storage to get it through the  
06 critical dry cycle or the ability to conjunctively use it  
07 with groundwater, in other words, some way to balance out  
08 the zero years?

09 MR. FORKEL: Yes, it would.

10 MR. SCHULZ: Did your studies all assume that the water  
11 developed will be exported through Banks and Tracy?

12 DR. BROWN: Yes. In our simulations, all of the water  
13 available for export is assumed to be exported, if there is  
14 a pumping capacity available.

15 MR. SCHULZ: Are you assuming that the state and  
16 federal projects will be the purchasers of that water?

17 DR. BROWN: No, no assumption on who would purchase the  
18 water. It may. However, it would have to go through their  
19 facilities since they have the only pumping facilities in  
20 the Delta.

21 MR. SCHULZ: Do you have any purchasers for the water  
22 at this time?

23 MR. FORKEL: At this time we don't have a specific  
24 buyer, but we have been talking to several people.  
0584

01 MR. SCHULZ: Are you asking the State Board to allow  
02 Delta Wetlands to begin constructing the project facilities  
03 prior to the time you would have contracts with buyers?

04 MR. FORKEL: We are asking for the State Board to give  
05 us our water rights prior to having a buyer, yes.

06 MR. SCHULZ: Are you asking the State Board to not  
07 include any condition which would restrict the start of  
08 construction?

09 MR. FORKEL: That is correct.

10 MR. SCHULZ: You would propose to start construction  
11 prior to the time that you have a buyer for the water?

12 MR. FORKEL: We would, yes.

13 MR. SCHULZ: Are you asking the State Board to allow  
14 you to fill the reservoirs before you have such buyers?

15 MR. FORKEL: Yes, we are.

16 MR. SCHULZ: My understanding is that, although you  
17 have a stipulation with the Bureau, that you would not  
18 release water until you have some sort of operations  
19 agreement with them; is that correct?

20 MR. FORKEL: That is true.

21 MR. SCHULZ: So you would be allowed to construct,  
22 fill, but not release until certain things are in place?

23 MR. FORKEL: We are fairly confident that those will be

24 in place before we get that far.

25 MR. SCHULZ: Mr. Easton, there are a couple places in  
0585

01 this testimony that you would be the one to answer. I think  
02 you were the one that testified last week that the State  
03 Board -- one reason the State Board should issue a permit  
04 for this project is to remove, this probably is a paraphrase  
05 but I think it is pretty close, the last impediment to the  
06 Delta Wetlands being able to negotiate a contract for the  
07 sale of the water.

08 Do you recall that in your testimony?

09 MR. EASTON: Jim Easton. Yes.

10 MR. SCHULZ: Would you expand on what you meant by that  
11 statement? I didn't really follow what it was that the  
12 Board would be doing that would help you negotiate contracts.

13 MR. EASTON: I think that there has been considerable  
14 skepticism on the part of the water community about the  
15 viability of this project. And I think that, as we have  
16 progressed toward receiving water right permits, that those  
17 impediments have been removed. And I think, certainly, the  
18 issuance of the water rights permits will be the removal of  
19 the last of those impediments.

20 MR. SCHULZ: I don't think I will follow-up on that.

21 Mr. Forkel, I want to talk about your 7B.

22 Is that the --

23 MR. FORKEL: Day in the Life.

24 MR. SCHULZ: That is the Day in the Life table. I am  
25 also going to be probably talking about the Final Operations  
0586

01 Criteria at the same time.

02 You talked about the initial diversion criteria as  
03 requiring that the X2 be below Chipps Island for at least  
04 ten days before you start diverting, particularly in the  
05 months of December, January, February, and March. And you  
06 gave a hypothetical in the Day in the Life. What I would  
07 like to do is modify that hypothetical a little bit to see  
08 what happens under other circumstances.

09 If you had a freshet, rain-fed storm, something of that  
10 nature in January, that took the X2 line beyond Chipps for  
11 the requisite ten days, and you started diverting, and let's  
12 say you got half full. But it was a year when you weren't  
13 able to get completely full at that time.

14 Then, one of the other criteria, whether it be the  
15 65/35, or who knows what restriction it would be, forced you  
16 at the time that you were about half full to stop  
17 diverting, and that was the situation. It was a relatively  
18 dry winter. Along came March, and the situation was now  
19 again we had some water come in and the diversions could  
20 recommence under all the criteria.

21 Am I correct in reading your initial diversion criteria  
22 that that only applies to the January start, the first time  
23 you divert during the year, and you could divert in March  
24 under the hypothetical I have just given, even if the X2  
25 line was at or near Collinsville? Or would you have to get  
0587

01 it back up below Chipps again in order to recommence your  
02 diversions in March?

03 MR. FORKEL: The way the criteria is set up, the  
04 initial diversion was to protect the first freshet and the  
05 biological effects associated with it. A subsequent storm  
06 event would not have the same ten-day waiting criteria.  
07 Although, in March, there are many more criteria that are in  
08 place as well as, not listed here, in the Water Quality  
09 Control Plan. There are X2 criteria often at Chipps, more  
10 normally than not, and oftentimes at Roe Island, so we would  
11 not be required to do a ten-day wait, though.

12 MR. SCHULZ: You could divert, if everything else was  
13 in place, even if the X2 line was, say, a couple kilometers  
14 below Collinsville, for example?

15 MR. FORKEL: If the criteria in the Water Quality  
16 Control Plan determined that there was excess conditions.

17 MR. SCHULZ: There is a 75-percent limitations on the  
18 discharge side of your Final Operations Criteria. There is  
19 a 75-percent limitation on the use of the facilities, I  
20 guess the export facilities, in the month of July from Webb  
21 Tract and a 75- or 50-percent limitation on the diversions  
22 from Bacon during the months of February through July.

23 Are you familiar with that?

24 MR. FORKEL: Yes.

25 MR. SCHULZ: What is the source of those limitations?  
0588

01 Were those mandated by Fish and Wildlife Service?

02 MR. FORKEL: Yes. They were included in the Final  
03 Operations Criteria, in our biological opinions.

04 MR. SCHULZ: I understand that. But I guess I am  
05 trying to figure at whose urging. And somebody tells me it  
06 was Fish and Wildlife Service.

07 Could you tell me what biological reason they posited  
08 for saying how much percentage of available diversion  
09 capacity you could use if all other conditions are in place  
10 with respect to the Water Quality Control Plan, et cetera,  
11 et cetera?

12 MR. FORKEL: I think that goes to the entire Final  
13 Operations Criteria. They just were trying to protect the  
14 Delta, and every one of these criteria goes beyond the Water  
15 Quality Control Plan. So, I think it is the same theme that  
16 provides some additional protection or buffer.

17 MR. SCHULZ: If the Department of Water Resources did  
18 turn out to be a buyer of this, they would not be able to  
19 use their own pumping capacity, over and above these  
20 amounts, in order to use this water; is that correct?

21 MR. FORKEL: In July, yes.

22 MR. SCHULZ: Or from Bacon Island in February, March,  
23 April, May, June, and July?

24 MR. FORKEL: That is correct.

25 MR. SCHULZ: You indicated that you hadn't selected a  
0589

01 buyer; you have been talking to a number of people. But  
02 that you were assuming that all the water would go through  
03 Banks and Tracy.

04 Were you assuming, and I am not asking you to make a  
05 legal opinion here, please believe that, but the Katz Bill,  
06 Water Code Section 1810 is a procedure which allows people  
07 to use excess capacity in somebody else's conveyance

08 facility up to 75 percent.

09 Is Delta Wetlands making an assumption that you would  
10 utilize, if the Department and the Bureau was not the  
11 buyer, you would utilize provisions like Water Code Section  
12 1810 to gain capacity to the state and federal conveyance  
13 facilities?

14 MR. FORKEL: You know, I am not an attorney --

15 MS. SCHNEIDER: That was responded to earlier.

16 MR. SCHULZ: No, it was not. I asked him whether they  
17 were using the assumption that they would utilize that. I  
18 am asking to interpret 1810; I am asking whether or not.  
19 That is an assumption that is included within their  
20 operating.

21 HEARING OFFICER STUBCHAER: You can answer to the best  
22 of your ability.

23 MR. FORKEL: I believe so, yes.

24 DR. SCHULZ: As I read the Final Operations Criteria,  
25 you have rights to top off diversion maximum rate in the

0590  
01 months of June, July, August, September, and October. That  
02 is set forth in the operations criteria, which you can  
03 replace evaporative losses. If I am reading that, do you  
04 only have top off rights at the fall midwater trawl as above  
05 239 and none if it is below 239?

06 MR. FORKEL: No, that is not correct.

07 MR. SCHULZ: You have a -- so you can --

08 MR. FORKEL: When it is below 239 there is a top off --

09 MR. SCHULZ: I see. It is just less. I got it now.  
10 I was looking in the wrong spot.

11 My understanding from previous testimony is you say you  
12 are using this, that you are going to be using your  
13 appropriative and riparian rights for this purpose, not the  
14 new rights that you are seeking from the Board in these  
15 proceedings.

16 MR. FORKEL: Sometimes, yes.

17 MR. SCHULZ: Those rights are direct diversion rights.  
18 There is no storage rights within those older rights; is  
19 that correct?

20 MR. FORKEL: That's correct.

21 MR. SCHULZ: Again, I am not asking for a legal opinion  
22 on the right to use direct diversion to replace evaporative  
23 storage. What I am asking, have you received any  
24 information from State Board staff or their attorneys or  
25 anybody else, in the process of doing the EIR or preparing

0591  
01 for this, that the Board believes that you can use direct  
02 diversion rights for storage of water in reservoirs? Have  
03 you received any information from Board or Board staff in  
04 that respect?

05 MR. FORKEL: I think you'd have to talk to our  
06 attorneys. They've been in contact with the staff.

07 MR. SCHULZ: Quite frankly, Mr. Stubchaer, I am fully  
08 familiar with the first-in-first-out rule and all of those  
09 things with respect to reservoir operations, and this is an  
10 interesting twist on the concept. I am just trying to  
11 figure out whether there is anything around that State Board  
12 has produced, so the parties just aren't sort of left in the

13 dark about briefing this issue, and whether or not there is  
14 anything that is in writing that the Board staff has put  
15 together with respect to use of direct diversion rights to  
16 offset evaporative losses in the storage reservoirs.

17 HEARING OFFICER STUBCHAER: I understand the question.

18 Ms. Leidigh, do you have any comments on how this  
19 question might be answered?

20 MS. LEIDIGH: Right now, off the top of my head, I am  
21 not aware of anything that we've got on that. I can look  
22 around. Perhaps Ms. Schneider would be able to remember  
23 something or be able to produce, but I don't recall anything  
24 right now.

25 HEARING OFFICER STUBCHAER: How would we procedurally  
0592  
01 research this question and get the information to Mr. Schulz  
02 and into the record?

03 MS. LEIDIGH: Probably through, if Delta Wetlands  
04 wanted to offer it, if they had it and wanted to offer it.

05 HEARING OFFICER STUBCHAER: Is it voluntary on their  
06 part? Can Mr. Schulz request it, and we require it?

07 MS. LEIDIGH: He could go so far as to subpoena any  
08 kind of documentation like that that would be in their  
09 possession.

10 MR. SCHULZ: I expect that ultimately we might end up  
11 having to legally brief this subject. I was just trying to  
12 ascertain whether or not, since EIR is so far along, whether  
13 there have been any preliminary determinations as to whether  
14 this was in the realm of what the Board felt was  
15 appropriate.

16 HEARING OFFICER STUBCHAER: I understand the question.  
17 What is not clear to me is how we get answers to these legal  
18 questions. That came up last week, too.

19 Ms. Schneider, do you have any comment on this issue?

20 MS. SCHNEIDER: Well, I do think this is a subject  
21 that probably will be covered in the legal briefing at the  
22 Board's request. I think that you're raising questions that  
23 I don't believe the Board has ever addressed in Chief  
24 Counsel memos or in any other decision. So, it will require  
25 legal briefing. And to the extent that this issue has been

0593  
01 raised by the Department of Fish and Game, some information  
02 may come out in the direct and cross of Fish and Game.

03 But to my knowledge, Cliff, there is nothing that the  
04 Board has produced on this issue.

05 HEARING OFFICER STUBCHAER: Thank you.

06 MR. SCHULZ: Always rely on to Ms. Schneider to push  
07 the envelope.

08 Real quick, just a couple questions on fish.

09 Does your environmental analysis or anything else that  
10 you have done with respect to the fishery, discuss,  
11 describe, or analyze the impact of your project on recovery?  
12 In other words, the definition of recovery for both  
13 winter-run salmon and Delta smelt, and how it could affect  
14 the recovery plans and the timing of recovery.

15 MR. SHAUL: Warren Shaul.

16 The question is whether we evaluated the effects of  
17 Delta Wetlands Project in specific to recovery plans?

18 MR. SCHULZ: Exactly.  
19 MR. SHAUL: I don't have the recovery plans here, but I  
20 think the recovery plans require more information than is  
21 currently available. You almost have to have a population  
22 model. And there are no population models that can predict  
23 whether or not you are going to meet that recovery. Our  
24 analysis did address whether we thought the project had a  
25 significant impact on the conditions that affect those

0594  
01 species.

02 MR. SCHULZ: I have two more questions.

03 HEARING OFFICER STUBCHAER: Okay.

04 MR. SCHULZ: Did your modeling deal with marsh  
05 salinities?

06 DR. BROWN: The marsh salinities are not directly  
07 included in the salinity. We analyzed salinity at Chipps  
08 Island and at Collinsville. So to the extent that those  
09 might be used as indicators of conditions in the Suisun  
10 Marsh, those might be used as indicators. But there is not  
11 a station in Suisun Marsh that was analyzed for salinity.

12 MR. SCHULZ: For purposes of checking compliance with  
13 the Water Quality Control Plan and the requirements of  
14 operations of the SWP and CVP, you did not include marsh  
15 conditions?

16 DR. BROWN: That is right. Marsh conditions, salinity,  
17 is not evaluated.

18 MR. SCHULZ: Your model, I believe, has salinity  
19 boundary conditions at Benecia; is that correct?

20 DR. BROWN: Yes. That is the downstream extent of the  
21 salinity model, Benecia.

22 MR. SCHULZ: That is all I have.

23 HEARING OFFICER STUBCHAER: Thank you, Mr. Schulz.  
24 Before we take our morning break, let's go over the agenda.  
25 After the break, we will have cross-examination by the

0595  
01 Department of Fish and Game, then by our staff, and perhaps  
02 by Board Members.

03 After that, Delta Wetlands will have the opportunity to  
04 present redirect testimony, if they so choose. If they do  
05 present redirect, then there could be recross, limited to  
06 the items brought up on redirect.

07 We will take a 12-minute break.

08 (Break taken.)

09 HEARING OFFICER STUBCHAER: Ms. Murray, we will  
10 reconvene the proceedings with cross-examination of the  
11 Delta Wetlands' panel by Fish and Game.

12 Ms. Murray.

13 MS. MURRAY: Thank you. And our cross-examination will  
14 take approximately one hour, and we will start with Warren  
15 Shaul.

16 ---oOo---

17 CROSS-EXAMINATION OF DELTA WETLANDS PROPERTIES

18 BY DEPARTMENT OF FISH AND GAME

19 BY MS. MURRAY

20 MS. MURRAY: Mr. Shaul, good morning.

21 MR. SHAUL: Morning.

22 MS. MURRAY: Does the fall midwater index predict the

23 abundance of young-of-the-year Delta smelt for the next  
24 year?  
25 MR. SHAUL: What you mean by the next year, the fall  
0596  
01 midwater trawl index --  
02 MS. MURRAY: For the following year.  
03 MR. SHAUL: Is that what you mean, does it predict the  
04 next year's -- can you use it to predict the next year's  
05 fall midwinter trawl index?  
06 MS. MURRAY: Can you use it to predict the next year's  
07 abundance of young-in-the-year Delta smelt?  
08 MR. SHAUL: No, it doesn't correlate very well. It is  
09 the best estimate we have of the current population.  
10 MS. MURRAY: But it doesn't correlate very well; is  
11 that your testimony?  
12 MR. SHAUL: It doesn't correlate with the next year's  
13 abundance index; that is correct.  
14 MS. MURRAY: Turn to Appendix A, Table 7 of your  
15 testimony. I have brought some slides in an effort to make  
16 this go a little faster.  
17 MS. LEIDIGH: I would like to have these slides  
18 identified for the record.  
19 MS. MURRAY: This is Appendix A, Table 7 of DW-15.  
20 MS. LEIDIGH: Thank you.  
21 MS. MURRAY: Is it correct to say that your estuarian  
22 habitat model predicts the abundance of the Delta smelt in  
23 the fall based on spring habitat conditions?  
24 MR. SHAUL: Does it predict it? How well does it  
25 predict it, or what --  
0597  
01 MS. MURRAY: Is that what your habitat model does, use  
02 the spring conditions to predict for the fall?  
03 MR. SHAUL: What the habitat model does is it estimates  
04 the habitat area. That is all the habitat model itself  
05 does. It doesn't necessarily make a prediction. These  
06 equations that you have here are just showing there is a  
07 significant relationship between habitat and abundance. But  
08 it doesn't necessarily -- the model itself, the way we use  
09 it, we didn't use it to make a prediction of abundance.  
10 MS. MURRAY: How accurate, based on looking at this  
11 table, how accurate is your estuarian habitat model for  
12 Delta smelt as compared to other species?  
13 MR. SHAUL: What we are looking at here is what  
14 proportion of the variability does the model explain; and  
15 it's compared to longfin smelt. That is relatively less,  
16 .19 is the R squared value, so it is relatively low.  
17 MS. MURRAY: Relatively low as compared to longfin  
18 smelt, and as compared to striped bass?  
19 MR. SHAUL: Yes, it would also be low.  
20 MS. MURRAY: And as compared to shrimp?  
21 MR. SHAUL: Yes.  
22 MS. MURRAY: If you added the last three years to this  
23 table, would the relationship for Delta smelt be stronger or  
24 weaker?  
25 MR. SHAUL: I have not done that analysis.  
0598  
01 MS. MURRAY: You have not received any information from

02 the Department of Fish and Game that would allow you to do  
03 that analysis?  
04 MR. SHAUL: Yes, I have received it, but I haven't done  
05 the analysis.  
06 MS. MURRAY: Haven't done it. Okay.  
07 Of the 28 years that the fall midwater trawl has been  
08 calculated, how many years has the index been greater than  
09 239?  
10 MR. SHAUL: Okay. The past ten years?  
11 MS. MURRAY: Twenty-eight years.  
12 MR. SHAUL: How many years has the index been greater  
13 than 239? Can I look it up?  
14 MS. MURRAY: Sure.  
15 You can use an approximate.  
16 MR. SHAUL: Looks like somewhere around 23 years,  
17 somewhere in there.  
18 MS. MURRAY: Twenty-three years that it has been  
19 greater than 239?  
20 MR. SHAUL: Greater than 239; at least from what I am  
21 looking at here. I don't have the actual --  
22 MS. MURRAY: You don't recall that it might be closer  
23 to about eight years?  
24 MR. SHAUL: Eight years that it was greater than 239  
25 and the rest of the time it was less than 239?  
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01 MS. MURRAY: Yes. That is not your recollection?  
02 MR. SHAUL: No. In the last 28 years?  
03 MS. MURRAY: Yes.  
04 MR. SHAUL: I don't think so.  
05 MS. MURRAY: Please turn to Appendix A, Table 2 of  
06 Appendix F2 of the Draft EIR. We have a slide for this.  
07 That is Appendix A, Table 2 of Appendix F2 of the Draft EIR.  
08 We saw this during your direct testimony.  
09 Based on this table, would you conclude that March and  
10 May are both critical periods for Delta smelt?  
11 MR. SHAUL: That larvae occur in both March, April,  
12 May?  
13 MS. MURRAY: Right. March is equally critical as May?  
14 MR. SHAUL: I wouldn't call it equally critical  
15 because the larvae that occur in March will be either older  
16 larvae or will be juveniles during the following months.  
17 So, you actually have a greater proportion of the population  
18 in the Delta from that year class by the time you get to  
19 May, than you did have in March. Even though you have --  
20 MS. MURRAY: Would you agree that the percent of annual  
21 production in March is equal to that of May?  
22 MR. SHAUL: Over the long term? These are averages.  
23 MS. MURRAY: Looking at Appendix A, Table 2.  
24 MR. SHAUL: Right. And the proportions of larvae  
25 produced in the Delta in March is close to what is produced  
0600  
01 in May, yes.  
02 MS. MURRAY: In fact, according to the table, equal?  
03 MR. SHAUL: According to that table, right, which is  
04 based on averages.  
05 MS. MURRAY: When you stated that there would be no  
06 significant change in direct entrainment -- this is Page 26

07 of your testimony, Question 53. You stated there would be  
08 no significant change in direct entrainment due to Delta  
09 Wetlands Project.

10 Were you referring to all life stages of species?  
11 MR. SHAUL: What is your question?  
12 MS. MURRAY: Page 26, Question 53.  
13 MR. SHAUL: And whether entrainment --  
14 MS. MURRAY: No significant change in direct  
15 entrainment due to the Delta Wetlands Project.  
16 Were you referring to all life stages?  
17 MR. SHAUL: Those were all except the larval life  
18 stages.  
19 MS. MURRAY: It does not include the larval life  
20 stages?  
21 MR. SHAUL: Correct.  
22 MS. MURRAY: Which we have identified as occurred in  
23 March in equal proportions to May?  
24 MR. SHAUL: No. That is not quite stated. The current  
25 March --

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01 MS. MURRAY: Equal percentage of annual production, is  
02 that --  
03 MR. SHAUL: The production of larvae, that's correct.  
04 MS. MURRAY: In your testimony at Page 40, you indicate  
05 that Middle River between Bacon Island and Clifton Court  
06 Forebay is unlikely to be the primary rearing area for  
07 larval Delta smelt.  
08 MR. SHAUL: Which number?  
09 MS. MURRAY: Page 40. It is the very last sentence,  
10 Question 82.  
11 MR. SHAUL: That is true.  
12 MS. MURRAY: Are you aware in 1997 the primary rearing  
13 area for larval Delta smelt was the Central and South  
14 Delta? Are you aware of that?  
15 MR. SHAUL: From the data I have seen so far, I am  
16 aware that the highest proportion of larvae captured was in  
17 that part of the Delta.  
18 MS. MURRAY: Does the Central and South Delta include  
19 Middle River between Bacon Island and Clifton Court Forebay?  
20 MR. SHAUL: The South Delta is between Bacon Island and  
21 Clifton Court in the channels of Old and Middle River.  
22 MS. MURRAY: Thank you.  
23 Page 37 of your testimony, Question 76.  
24 Please turn to Delta Wetlands Exhibit 4, Page 8.  
25 MR. SHAUL: I must be confused.

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01 MS. MURRAY: Delta Wetlands Exhibit 4.  
02 MR. SHAUL: That is the March 20th analysis?  
03 MS. MURRAY: Yes.  
04 MR. SHAUL: What page in that?  
05 MS. MURRAY: Please explain the statement on that page,  
06 the last full paragraph of that page, that states:  
07 Compared with the diversions simulated under  
08 Delta Wetlands ESA alternative, Figure 1,  
09 monitoring could also allow additional  
10 diversions. (Reading.)  
11 MR. SHAUL: What page is that on?

12 MS. MURRAY: Page 8.  
13 MR. SHAUL: I must have the wrong exhibit. I need  
14 Exhibit 4. I don't have that.  
15 MS. MURRAY: We're looking for it. Last full  
16 paragraph on that page. First sentence, last full paragraph  
17 of that page.  
18 Compared with the diversions simulated under  
19 DWESA alternative, Figure 1, monitoring could  
20 also allow additional diversions. (Reading.)  
21 Do you see that now?  
22 MR. SHAUL: Yes.  
23 MS. MURRAY: What additional fishery impacts could  
24 result from these additional diversions?  
25 MR. SHAUL: It would depend on what the conditions were  
0603  
01 at the time of the diversion.  
02 MS. MURRAY: Could additional fishery impacts result  
03 from these additional diversions?  
04 MR. SHAUL: Yes.  
05 MS. MURRAY: During years when ten percent of project  
06 discharges are supposed to be dedicated as environmental  
07 water, on average, what is the amount of water that will  
08 actually be released to outflow from the reservoir islands?  
09 MR. SHAUL: That is a question Russ should answer.  
10 MS. MURRAY: I was going to say, if you can or anyone  
11 else on the panel.  
12 Do you want me to repeat the question.  
13 DR. BROWN: No. I think I have the question. I am  
14 trying to remember what -- the requirements for  
15 environmental water are based on diversions or discharges?  
16 MR. FORKEL: Discharges, December through June.  
17 DR. BROWN: The modeling that we did that attempted to  
18 match those requirements on average, Dave has the table for  
19 me. The 70-years average amount of water that this requires  
20 is about 3,000 acre-feet.  
21 MS. MURRAY: Are you calculating that based on the full  
22 ten percent, or are you taking out the credit that you get  
23 for the habitat water?  
24 DR. BROWN: This is the full ten percent.  
25 MS. MURRAY: Will that actually be what is actually  
0604  
01 released to outflow?  
02 DR. BROWN: Yes. This is the ten percent that would be  
03 released for outflow.  
04 MS. MURRAY: So, you are not including the credit for  
05 habitat water in that calculation?  
06 DR. BROWN: Right, I am not including it in the model.  
07 MS. MURRAY: And you're not including it in the model.  
08 Thank you.  
09 Mr. Shaul, at Page 29 of your testimony, you refer to  
10 using the State Water Project and CVP salvage records from  
11 1979 to 1990 in your analysis. That is paragraph 57.  
12 MR. SHAUL: Yes.  
13 MS. MURRAY: You concluded that for larval and juvenile  
14 Delta smelt, less than 38 millimeters, the impacts of the  
15 Delta Wetlands Project on Delta smelt populations could be  
16 significant. Is that correct?

17 MR. SHAUL: Is this in the same --  
18 MS. MURRAY: Last sentence. Question 57, first  
19 paragraph.  
20 MR. SHAUL: Yes.  
21 MS. MURRAY: Please turn to, and I have a slide on  
22 this, Delta Wetlands Exhibit 1, Figure 5A. A little bit  
23 hard to read. But the SWP salvage figure -- this is Delta  
24 Wetlands Exhibit 1, Figure 5A.  
25 This figure shows that Delta smelt salvage at the SWP  
0605  
01 from 1968 to 1973?  
02 MR. SHAUL: Yes.  
03 MS. MURRAY: Were the salvage numbers from 1968 to 1979  
04 higher than the salvage numbers from 1979 to 1990?  
05 MR. SHAUL: No.  
06 MS. MURRAY: Based on this graph, does it appear that  
07 salvage numbers from '68 to '79 were significantly higher  
08 than the period '79 to '90?  
09 MR. SHAUL: Based on this graph, yes.  
10 MS. MURRAY: Looking at the salvage records from '68  
11 to '91, would you expect the entrainment impact of the Delta  
12 Wetlands Project to be higher if you analyzed the period  
13 from 1968 to 1991 than if you analyzed the period, as you  
14 did, 1979 to 1990? Based on this graph, would you expect to  
15 be higher?  
16 MR. SHAUL: We are talking about -- we switched things  
17 here. We switched from the salvage and planktonics. I need  
18 to emphasize this does not include planktonic life stages.  
19 MS. MURRAY: Just based on -- we are looking only at  
20 this graph with the salvage records.  
21 MR. SHAUL: Salvage does not include planktonic life  
22 stages. I just wanted to clarify that.  
23 MS. MURRAY: With that clarification?  
24 MR. SHAUL: The question is it -- the purpose of the  
25 analysis --  
0606  
01 MS. MURRAY: Looking at this graph --  
02 HEARING OFFICER STUBCHAER: Would you please let him  
03 complete his statement.  
04 MS. MURRAY: I thought he was confused by the question.  
05 MR. SHAUL: I was trying to tell you, the purpose of  
06 the analysis was not to predict salvage or predict  
07 entrainment. It was as a comparative basis. So, what was  
08 more important is the seasonal pattern of salvage occurs,  
09 and not so much the numbers that were involved. So it is  
10 the seasonal pattern does not shift from prior to 1979, and  
11 it wouldn't really matter whether you used -- to my analysis  
12 it wouldn't have mattered which period I used. What I am  
13 looking at is what the seasonal pattern is and what the  
14 change in the effect on salvageable or screenable size fish  
15 could be.  
16 MS. MURRAY: So, in your analysis, numbers of SWP  
17 salvage, salvage numbers do not matter?  
18 MR. SHAUL: The numbers themselves do not matter. It's  
19 the seasonal distribution is what matters. That is  
20 correct.  
21 MS. MURRAY: Did you use SWP salvage numbers in your

22 analysis?

23 MR. SHAUL: What we -- yes, we did. What we used --

24 MS. MURRAY: You used '79?

25 HEARING OFFICER STUBCHAER: Please let him, allow him  
0607

01 to answer.

02 MR. SHAUL: What we were using was not -- we weren't  
03 trying to estimate what the losses would be. What we were  
04 using the numbers for was to establish when were they most  
05 seasonally vulnerable. When were the salvageable size fish  
06 most vulnerable. Were they most vulnerable in May? Were  
07 they most vulnerable in June? To overlay that over, when  
08 the Delta Wetlands' operations occur, when the Delta  
09 Wetlands' operations have the greatest affect on salvageable  
10 size fish.

11 So, whether we used the period prior to 1979 or after  
12 1979, didn't really matter. Because what we were trying to  
13 get at is the seasonal pattern. So unless there was a big  
14 shift in the seasonal pattern, it wouldn't make any  
15 difference to our analysis. We could still come to the same  
16 conclusion.

17 MS. MURRAY: Page 18 of your testimony, Question 29.  
18 You testified that:

19 The U.S. Fish and Wildlife Service Delta  
20 fall-run chinook salmon mortality model  
21 assumes that exports affect only salmon drawn  
22 off the Sacramento River through the Delta  
23 Cross Channel and Georgiana Slough.  
24 (Reading.)

25 Do you see that?  
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01 MR. SHAUL: That is true.

02 MS. MURRAY: Can Delta Wetlands' diversions and exports  
03 draw salmon off the Sacramento River at other locations?

04 MR. SHAUL: The Delta Wetlands Project does not affect  
05 the proportion of flow coming off the Delta Cross Channel  
06 and Georgiana Slough. You are asking whether --

07 MS. MURRAY: Draws fish off.

08 MR. SHAUL: Draws fish off rivers at other locations?

09 MS. MURRAY: Draws salmon off the Sacramento River at  
10 other locations besides Delta Cross Channel and Sacramento  
11 River?

12 MR. SHAUL: That hasn't been conclusively shown,  
13 whether it's Delta Wetlands or whether -- Delta Wetlands  
14 does not affect the -- from what we know about flow splits  
15 and how the salmon move the flow splits, that has been  
16 studied well for the Georgiana Slough and the Delta Cross  
17 Channel.

18 But as far as whether, say, water moving -- Sacramento  
19